WHAT IS CLAIMED IS:

1. A method of producing an array of at least two different nucleic acid ligands covalently bonded to a surface of a substrate, said method comprising:

(a) contacting blocked nucleoside monomers to at least a first location and a second location of a substrate surface displaying functional groups under conditions sufficient for said blocked nucleoside monomers to covalently bond to said surface in said first and second locations to produce a substrate surface displaying covalently bound blocked monomers;

(b) contacting said surface displaying blocked nucleoside monomers with an oxidation fluid to produce an oxidized surface;

(c) contacting said oxidized surface with a deblocking fluid;

(d) removing deblocking fluid from said deblocked surface by displacing said deblocking fluid from said surface with a wash fluid; and

(e) reiterating steps (a) to (d) at least once to produce said array of at least two different nucleic acid ligands.

2. The method according to Claim 1, wherein said wash fluid has a density that is different from said deblocking fluid.

3. The method according to Claim 2, wherein said wash fluid and said deplocking fluid have a density difference (A) that is greater than 0.

4. The method according to Claim 3, wherein said wash fluid has a density that is lower than the density of said deblocking fluid.

5. The method according to Claim 1, wherein said wash fluid is a low viscosity fluid.

6. The method according to Claim 5, wherein said wash fluid has a viscosity that does not exceed about 1.2 cP.

7. The method according to Claim 8, wherein said wash fluid is an organic fluid.

8. The method according to Claim 10, wherein said wash fluid is acetonitrile.

9. The method according to Claim 1, wherein said deblocking fluid is displaced from said surface with a wash fluid according to step (d) by flowing said wash fluid across said surface in a manner sufficient to produce a stratified fluid interface that moves across said surface.

10. The method according to Claim 11, wherein said wash fluid is flowed across said surface at a rate ranging from about 1 cm/s to about 20 cm/s.

11. The method according to Claim 11, wherein said method further comprises sensing movement of said stratified fluid interface as it moves across said surface.

12. The method according to Claim 1, wherein at least steps (c) and (d) occur in a flow cell.

13. The method according to Claim 12, wherein steps (b), (c) and (d) occur in a flow cell.

14. The method according to Claim 13, wherein steps (b), (c) and (d) occur in the same flow cell.

15. The method according to Claim 1, wherein said surface is contacted with a capping solution prior to said deblocking step (c).

16. The method according to Claim 1, wherein said blocked nucleoside monomers are contacted with said surface by pulse-jet deposition.

17. A nucleic acid array produced according to the method of Claim 1.

18. A method of detecting the presence of a nucleic acid analyte in a sample, said method comprising:

(a) contacting a sample suspected of comprising said nucleic acid analyte with a nucleic acid array according to Claim 17;

(b) detecting any binding complexes on the surface of the said array to obtain binding complex data; and

(c) determining the presence of said nucleic acid analyte in said sample using said binding complex data.

19. A method of transmitting data from a first location to a second location a result from a reading of an array according to Claim 18.

20. A method according to Claim 19, wherein said second location is a remote location.

21. A method comprising receiving data representing a result of a reading obtained by the method of Claim 18.

22. A kit for use in a hybridization assay, said kit comprising:
a nucleic acid array produced according to the method of Claim 17.

23. The kit according to Claim 22, wherein said kit further comprises reagents for generating a labeled target nucleic acid sample.

24. An apparatus for synthesizing an array of biopolymers on the surface of a support, said apparatus comprising:

(a) a reaction chamber;

(b) a mechanism for moving a support to and from said reaction chamber;

(c) a controller for controlling the movement of said mechanism of step (b);

(d) one or more fluid dispensing stations in fluid communication with said reaction chamber;

(e) a controller for controlling said mechanism of (d) in a manner according to the method of claim 1;

(f) a mechanism for activating said fluid dispensing stations to independently dispense reagents to the surface of a support, said mechanism being cooperative with said mechanism of (d); and

(g) a controller for controlling said mechanism of (e), and (f) one or more additional chambers for conducting reactions that form part of said synthesis.

25. An apparatus according to claim 24 wherein said mechanism of (b) is a robotic arm.

26. An apparatus according to claim 24, wherein said holding chamber is a flow cell.

27. A computer-readable medium comprising:

programming for controlling the automated system of claim 24 according to the method of Claim 1.